Article Abstract

Title:	Modeling and analysis for surface roughness and material removal rate in machining of UD-GFRP using PCD tool
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Abstract:	In the present paper, an effective approach for the optimization of turning parameters based on the Taugchi's method with regression analysis is presented. This paper discusses the use of Taugchi's technique for minimizing the surface roughness and maximizing the material removal rate in machining unidirectional glass fiber reinforced plastics (UD-GFRP) composite with a polycrystalline diamond (PCD) tool. A multiple objective utility model has been studied to optimize both the dependent parameters. Experiments were conducted based on the established Taguchi's technique L_{18} orthogonal array on a lathe machine. The cutting parameters considered were tool nose radius, tool rake angle, feed rate, cutting speed, depth of cut and cutting environment (dry, wet and cooled) on the surface roughness and material removal rate produced. The performances of the cutting tool were evaluated by measuring surface roughness and material removal rate. A second order mathematical model in terms of cutting parameters is also developed using regression modeling. The results indicate that the developed model is suitable for prediction of surface roughness and material removal rate in machining of unidirectional glass fiber reinforced plastics (UD-GFRP) composites. The predicted values and measured values are fairly close to each other. The results are confirmed by further experiments.
Keywords:	UD-GFRP composites, ANOVA, multi response optimization, utility concept, regression modeling, surface roughness, material removal rate, polycrystalline diamond (PCD) tool.